

Modified Gold Screen Printed Electrode with Ruthenium Complex for Selective Detection of Porcine DNA

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Abstract : Studies on identification of pork content in food have grown rapidly to meet the Halal food standard in Malaysia. The used mitochondria DNA (mtDNA) approaches for the identification of pig species is thought to be the most precise marker due to the mtDNA genes are present in thousands of copies per cell, the large variability of mtDNA. The standard method commonly used for DNA detection is based on polymerase chain reaction (PCR) method combined with gel electrophoresis but has major drawback. Its major drawbacks are laborious, need longer time and toxic to handle. Therefore, the need for simplicity and fast assay of DNA is vital and has triggered us to develop DNA biosensors for porcine DNA detection. Therefore, the aim of this project is to develop electrochemical DNA biosensor based on ruthenium (II) complex, [Ru(bpy)₂(p-PIP)]²⁺ as DNA hybridization label. The interaction of DNA and [Ru(bpy)₂(p-HPIP)]²⁺ will be studied by electrochemical transduction using Gold Screen-Printed Electrode (GSPE) modified with gold nanoparticles (AuNPs) and succinimide acrylic microspheres. The electrochemical detection by redox active ruthenium (II) complex was measured by cyclic voltammetry (CV) and differential pulse voltammetry (DPV). The results indicate that the interaction of [Ru(bpy)₂(PIP)]²⁺ with hybridization complementary DNA has higher response compared to single-stranded and mismatch complementary DNA. Under optimized condition, this porcine DNA biosensor incorporated modified GSPE shows good linear range towards porcine DNA.

Keywords : gold, screen printed electrode, ruthenium, porcine DNA

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